

REMARKS

Claims 1-11, all the claims pending in the application, stand rejected. Claim 1 is amended. New claims 12 and 13 are added.

Amended Claim 1

Support for the amendments to claim 1 may be found throughout the original specification and, more particularly, at pages 4-6 where the problems are identified and pages 13-17 where the details for a solution are provided.

New Claims 12 and 13

Claims 12 and 13, which depend from claim 1, specify that the chemical strengthened magnetic disk glass substrate has a surface with Rmax of approximately 4.6nm and Ra of approximately 0.45nm, with the Rmax being 4.6nm or less and the Ra being .45nm or less. Support for the new claims may be found at pages 16 and 17, where the specific example identifies a measured Rmax of 4.6nm and a measured Ra of 0.45nm.

Further, the specification teaches at pages 14 and 15 that in general, the second mirror polishing process aims to reduce the surface roughness, for example, to 5nm or less in Rmax and 0.5nm or less in Ra while maintaining the flat surfaces obtained in the foregoing first mirror polishing process. The specific example that supported the Rmax of 4.6nm and the Ra of .45nm is based upon achievement of a surface roughness of the obtained glass disk substrate as measured by an AFM (atomic force microscope) to be a smooth mirror surface having Rmax of 4.8nm and Ra of 0.45nm. Thus, where the Rmax and Ra of the polished substrate are less than the value in the specific example, an Rmax and Ra of the chemically treated substrate would be expected to be less.

Claim Rejections - 35 USC § 103

Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over FORKER JR et al. (US 3,773,489) in view of AZOM (Dealing with Used Salt from Salt Furnaces) and BEHNER (Potassium Dichromate). This rejection is traversed for at least the following reasons.

Amended Claim 1

Claim 1 has been amended to focus the invention on a chemical strengthening treatment method of a magnetic disk glass substrate used in an information recording medium. In this regard, the claim further specifies the granular condition of the chemical strengthening salt when it is introduced into a treatment vessel for melting and subsequent immersion of a glass disk as to be chemically strengthened, specifically a grain size between 1 mm and 10mm, so that foreign particles or even salt clumps (formed because powdery salt absorbs moisture in an atmosphere to solidify amorphously) cannot be found in the molten salt. In this regard, the granular salt is introduced in a form such that the scattering of the granular chemical strengthening salt, which otherwise could attract foreign materials, is prevented.

Forker

In the Final Office Action, the Examiner asserts that “FORKER teaches a chemical strengthening treatment wherein a glass disk is brought into contact with molten salt (col, lines 12-16) as in instant claims 1 and 4” in the second paragraph. This is not accurate.

Applicants respectfully note that Forker’s description is directed to general glass articles, such as drinking tumblers (column 2, line 16), helicopter windscreens, and automobile sidelites (column 2, lines 17 to 18). There is no teaching or suggestion that Forker considers the unique environment and related problems for the production of magnetic glass disks used in an information recording medium. This is because using glass as a magnetic disk substrate was never known in the art when Forker’s patent application was filed on March 16, 1971, as suggested in the present specification.

AZoM

As to AZoM, there is a teaching with respect to the use of salt from salt bath furnaces, but there is no teaching related to a method of dealing with a magnetic disk glass substrate used in an information recording medium.

Behner

Although Behner shows a picture of Lab grown crystals, there is no teaching at all in Behner about whether or not such crystals can be suitable for chemically strengthening any

magnetic glass substrate used in an information recording medium and about any advantages that could result even if such crystals are applied to chemically strengthen the magnetic glass substrate used in the information recording medium.

Only Applicants Address Chemical Strengthening

Applicants respectfully submit that no one except the Assignee of the present application tries to chemically strengthen a glass substrate used in an information recording medium, as clear from the fact that both of Patent Documents D1 and D2 cited in the Background section of the original specification are disclosed and owned by that Assignee (Hoya). This shows that a chemical strengthened magnetic disk used in the information recording medium itself has not been developed in any companies other than the Assignee.

From this fact, Applicants respectfully submit that no one except the Assignee would have known of any problems which might be caused in a method of chemically strengthening a glass substrate used in an information recording medium. In other words, only the Assignee could make an invention related to the chemical strengthening method of the glass disk used in the information recording medium, as readily understood from page 3, line 6 from the bottom to page 4, line 15 of the original specification.

Specifically, no one could find the fact that powder chemical strengthening salt is scattered on introducing the chemical strengthening salt into a vessel and results in thermal asperity failure and head crash failure. Under the circumstances, the inventors discovered that changing powdery chemical strengthening salt into a granular chemical strengthening salt solved a major problem. This proposal is very helpful to obtain a chemically strengthened magnetic disk glass substrate which has a surface with Rmax of 4.6nm (or less) and Ra of 0.45nm (or less)(page 16, lines 5 to 2 from the bottom).

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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